THE BULLETIN

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Hydro-Electric Power Commission of Ontario

Sept.-October

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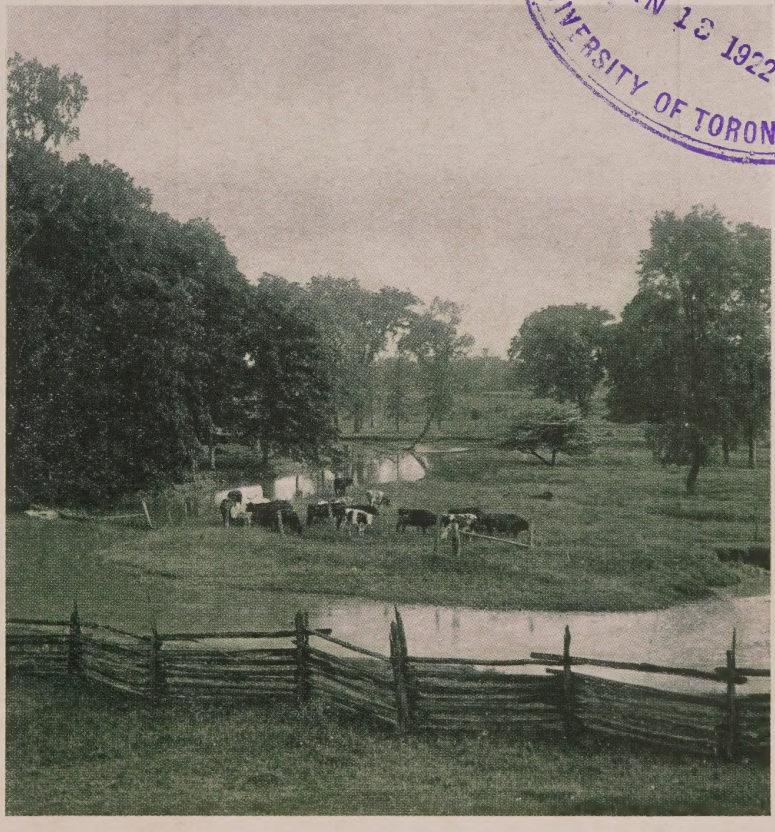

Rural Ontario

THE BULLETIN

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VOL. VIII. No. 5

SEPTEMBER-OCTOBER, 1921

Lady Beck

Hers not to lead vast armies into war,
But one who made each day worth living for;
Could this be said of all who come to birth,
How peaceful and how wonderful were earth.

In a humble cottage on the outskirts of Toronto a white haired woman was seated in a rocker crying softly to herself. Before her was a copy of one of the Toronto dailies conveying the sad news that the beloved wife of our Chairman had been stricken by the hand of death. And the poignant grief of this little old lady, who had never even seen the noble woman who had so suddenly passed away, was shared to the uttermost by the men and women of Canada, and more especially by the employees of the Commission and all of those associated in its work throughout the Province.

On the many occasions we have met at various conferences and meetings, when it was possible for Lady Beck to be present, her gracious personality was always a delightful inspiration to all of us. When she was not with us, Sir Adam never failed to impress the fact that her helpful and constructive aid, which had never wavered in the long trying years of his administration of the great enterprise which has been guided by his hand and vitalized by his genius, had been the greatest factor of all in upholding his courage and faith even in the darkest hours. And so we had come to realize that her hopes and ideals were ours also, that she was truly one of us, and without any aspect of intrusiveness, Lady Beck's place in the hearts of all connected with the work of the Commission must deny to our Chairman solitude in his grief.

It is not necessary here to elaborate on Lady Beck's countless activities in charitable works. The people of this country and the countries across the sea, know of a lifetime spent in the service of the sick, the suffering and the needy. Words could but feebly express the gratitude and love given to one, whose sincerity of purpose and outstanding love of service to others made her such a beloved and prominent figure in the life of this country. And the thing that impressed us most on the day of her funeral was not that all of Canada was represented there, as indeed it was, nor the strong faces of those who came to pay their tribute, but the tears in their eyes, which bore testimony to what we already knew, but did not know that we knew until we had felt our loss.

To those of us who came in personal contact with Lady Beck and who recall her dignified courtesy and gracious consideration for others, she challenged our unfeigned admiration and deep respect and her memory will never be forgotten. She was cut off at midday, serene in the consciousness of a performance to the utmost of the many tasks that were laid upon her, and the tears and blessings of those to whom in this life she had brought sunshine and gladness must follow her to the Place where she has been called.

—E. C. S.

Notes on the Accounting System of the Commission.

From a paper read by J. E. Pile at a recent meeting of the Electrical Engineering Technical Club.

IT would be difficult to exaggerate the importance of Accounting in affairs of business.

At the very threshold of civilization, when trade passed a step beyond the mere barter of one commodity for another, the necessity of keeping some sort of accounts arose. History tells us that the Babylonians used commercial documents at least four thousand years ago, and the Phoenecians are believed to have had their accountants no less than their clever manufacturers. Bills of Exchange were in use between Rome and Athens in the days of Cicero, and several text-books on commercial subjects were published in Florence during the fourteenth century and it is probable that we owe the invention of the system of double entry book-keeping, the system that is used today in practically all commercial houses, of this city, though the first known treatise on the subject was published in the fifteenth century in Venice. There would have been few banking houses of world wide fame in Florence if there had not been strict accounting and trained accountants to keep correctly the records of the vast business transacted there.

Coming down to our times, the successful management—even the very existence—of the great business enterprises depend upon the reports as ascertained from strict accounting for their guidance as to whether or not they are solvent or insolvent; in fact the report, or balance sheet, of an institution could well be called the official barometer of that institution.

Accounting is the scientific analysis and interpretation of financial and commercial transactions. It may be termed an exact science, which treats (1) of the methods of recording such transactions, and (2) of the rules by which such transactions may be interpreted from books of accounts, and explained intelligently to the layman for his guidance in business affairs. It is based upon a thorough knowledge of economics, finance, book-keeping and commercial law.

There are several classes of accounts all of which however, are governed by the same principle, but carried on under styles designed to suit the local conditions.

It is not my purpose to go into the details of the various classes of accounts but rather to endeavor to give you an idea how the accounting of this Commission is conducted.

To successfully do this, it seems to me, it is necessary to segregate the accounts, as kept by the Commission, under classes and deal with each class individually; and, with this end in

view, I will classify them as follows: Fixed Assets (Plant), Current Assets and Operation.

FIXED ASSETS:—

It is quite possible that the Fixed Assets will be of most interest to this Club, as they represent what is known as Plant, and consist of Stations, Lines, Real Estate, etc., something that you are in touch with daily.

In order that you may clearly understand how the capital cost of such Plant is built up and reflected in our books, it is necessary to take you back to the foundation, viz; the Work Order. The Work Order clearly defines the class of Plant that is to be installed, and should, if made out correctly, give sufficient particulars that would enable the accountant to determine whether the work to be performed would increase our Fixed Assets, commonly known as Capital Cost, or be a charge against the current year's revenue, or Renewals Reserve.

After obtaining the authority to proceed with the work, the Engineer issues requisitions for the necessary material, and here, Gentlemen, let me emphasize the importance of showing the correct accounting on these requisitions, as it is from this information that the accounts are finally posted to our ledgers, and just the slip of a figure in either the Work Order or the Control Account number, would, in all probability, place the expense in the wrong account.

From these requisitions orders are placed by the Purchasing Department with manufacturers or our Stores Department. Several copies of the order are made all being in different colors, and each color has some special signifiance. The white copy is sent to the vendor as the official order, together with a yellow copy, which the vendor signs and returns to the Purchasing Department as an acknowledgement of receiving the order; provision being made for them to state on that copy the approximate date that the consignment will be forwarded, this information being useful to the "Follow Up" Department. The blue copy, known as the Field copy, is sent to the person to whom the material is to be consigned, and is retained by him until the consignment is actually received. Directly the material is received and checked off, the Field copy is signed and returned to the Accounting Department, and is the authority for that department to pay all invoices received in connection with same, providing the prices and conditions agree with the purchasing order. The green copy is sent to the Accounts Payable Department for its record, and the pink copy or copies, as the case may be, are sent to the Heads of Departments, who are interested in that particular equipment.

In addition to this class of order, there is the Local Purchasing or Emergency order, an order, as the title implies, that may be used by duly authorized persons in case of emergency, or a case of holding up work unless material can be obtained within a short period of time.

The order having been placed and the material shipped, the next thing

to be considered is the vendors' invoices. These, upon receipt at the Accounts Payable Department, are numbered, checked and duly recorded in the Invoice Book, and attached to the green copy of the original order; and, unless there is discount allowed for payment within a given period, it remains there until the Field copy of order showing that material is received, is returned to the Accounting Department. Upon receipt of this Field copy of order, the invoice is vouchered and sent along to the Treasurer for payment.

In the case of an invoice being received for material not covered by an official order, same is recorded and passed along to the Construction Engineer for his certification, and is also sent to the Purchasing Department to note prices, before same is passed for payment. After passing through the Treasurer's hands, the vouchers are filed away for future reference. Distribution of the payment made, however, is sent along to the ledger-keeping department, there to be classified and recorded in the Commission's permanent records as part of the Capital Cost or Fixed Assets.

Other classes of expense which go to build up the Capital Cost consist of Labor, Engineering, Overhead Expense, Insurance and Interest, and these I will deal with in the order mentioned.

Labor: Details of Labor are submitted by the Field to the Payroll Department, where same are carefully checked as to extensions, entered on the payroll and passed along to the Treasurer for payment. So far as the distribution is concerned, the Accounting Department is practically in the hands of the Field Office, and has no means of checking the accuracy of the distribution submitted; and here again I want to emphaze the absolute necessity of accurate accounting on the part of the Field Office, as in all cases the distribution submitted is used and this is reflected in our books. Discrepancies occur both inside and outside, and we know it, but with care and a little closer co-operation these can be kept down to the smallest minimum.

Engineering: Compiled from data submitted by the engineers chiefly from Salary Distribution Sheets.

Overhead Expense: Included under this heading are three different and distinct classes of expense, viz: Field Overhead, Head Office Engineering and Superintendence, and Administrative Office Expense. The first consists of expenses of an undistributable nature in the Field, such as Railway Fares, lost time through unfavorable weather, delays in arrival of material, depreciation of tools and equipment, rental of equipment, the expense of which is distributed over other labor operations on a man-hour basis at the close of this job.

Head Office Engineering and Superintendence known as Overhead Construction expense, an expense of the Engineering and Construction Departments, which it is claimed cannot be alloted to any particular work order. This is distributed on an Engineering and man-hour basis on all work carried on during the current year.

Administrative and Executive Office Expense: Consisting of expenses of the Administrative Office Building, such as heating, lighting, cleaning, interest and fixed charges on the investment, together with Executive salaries, Accounting Department salaries, Stenographical help, Stationery and other miscellaneous items that are of a nondistributable nature. With a commercial house this class of expense is easily disposed of by applying it against the profit and loss account, but with an institution such as ours, which is constructing and operating at the same time, and operating at cost, thus leaving no margin of profit, we have no such an account to apply an expense of this nature against, consequently a means had to be found for the distribution of same. Much study has been given to this by the Accounting Department, and a method, which is considered equitable, and I may say, approved by outside experts, is being used, viz; by distributing same monthly on a percentage basis to labor and engineering expense, that is on all labor and engineering employed both for constructing and operating purposes.

Insurance: The Commission assumes all responsibility for accidents to its employees, and to create a fund for this purpose, all work where the Commission's labor and engineering is employed, is assessed at the rate of 2% on labor charges and a tenth of 1% on engineering salaries; and in case of an accident, the cost of the work upon which an accident may occur, is relieved of any further responsibility in connection with same.

Interest: Directly money is advanced by the Province for construction purposes interest commences to accrue upon same, and must be paid to the Province as it becomes due. While the work is under construction, however, the particular piece of Plant being installed is producing no revenue and the interest on expenditures made must be charged to the work and form part of the Capital Cost. Interest charges to construction cost, however, ceases directly the Plant is placed into operation.

The foregoing covers practically all the different classes of expense which go to build up our Fixed Assets, and when these are all included it may be assumed that the amount as shown in our records truly represents the cost of the Plant installed.

It is the purpose of this Commission to keep its Capital Cost clean, that is, that the amount as shown in our books shall at all times represent the actual cost of the equipment in operation. It frequently transpires that the equipment originally installed in a station or transmission line has, for various reasons, to be removed, either on account of obsolescence or insufficient capacity. In such cases the orignal amount paid for the equipment plus cost of engineering, labor and other expenses incidental to the first installation is removed from the Capital Cost. For instance, if a transformer is removed from a station, all capital invested in that station in respect to that transformer is taken out, thus, for the time being the amount remaining in our records represents the cost of the building, and

any other equipment that it was not necessary to remove. The value of the replacing equipment, together with labor and other expenses of installing same, can then go back into the station's cost, and our books will reveal the actual amount paid for the building and apparatus as it stands after the change has been made.

The same method is adopted in respect to transmission lines. It frequently happens when stringing an additional circuit on a line, that the existing circuit has to be moved. Now, if the moving expense was allowed to go in the capital cost with the labor of stringing the new circuit, we would have a charge there for something that was intangible, and our records would not represent the actual cost of the equipment on that section of line. Expenses of this nature are considered a Contingency, and are charged against our Contingency Account.

It might be of some interest to you to hear what kind of book entries are made in connection with the removal of equipment. If equipment is transferred from one point to another within a system, the original amount paid for such equipment is taken out of the cost of station from which same was removed, and transferred to the receiving station's Capital Cost, at the same figure irrespective of the present market price or condition of the equipment. The system's Renewals Reserve account is not touched, as the equipment is still in the same system, and the system's renewals reserve is common to all equipment no matter where it is installed, providing it is within the system. The only other account affected is the system's Contingency account, and to this is charged the original installation costs, together with the removal expense.

In the case of transferring apparatus from one system to another, the method is somewhat different. In the first place the station, from which the equipment is removed, is credited with the amount it actually paid for same, together with its installation cost, thus relieving the station of any money that had been invested in respect to the equipment removed. There is then the question of Renewals. During the time that equipment was in operation a certain amount of money had been charged against the revenue and placed in the Renewals Reserve account of that system, but, in view of the fact that the equipment has now been removed from the system, there is now no necessity to leave any money in the Renewals Account for its replacement.

The amount that has accrued, therefore, is withdrawn from the selling System Renewals account, and is used for the purpose of offsetting the difference between the original cost of the equipment installed and the amount realized from the sale of same. Any loss or gain resulting from the transaction is either debited or credited to the Contingency Account of the selling system.

You will have observed that the Capital Cost of the system, from which this equipment was removed, received credit for the exact amount it was originally charged for same, and has, therefore, no further interest in it

so far as its capital account is concerned.

The receiving or purchasing system, however, is charged with the current market price for similar equipment new, irrespective of the age or condition of the equipment transferred. This, at first, would seem to be an arbitrary method, but to offset this seemingly high price for secondhand apparatus, an amount is placed to the credit of the Renewals Reserve of the receiving system equivalent to what would have accrued had this particular equipment been operating there during its whole life, thus reducing the actual cost to the system to normal.

CURRENT ASSETS:

Passing from the Fixed Assets, we come to Current Assets. There are a number of items included in this class, but the principal ones, so far as Construction work is concerned, are: Stores and Merchandise, Construction Tools and Equipment.

To successfully carry on Construction work of any size, it is most essential that a large quantity of standard material be kept in stores ready for shipment at a moment's notice. This entails a fairly large investment, and, to meet the interest charges and other operating expenses incidental to the handling of the stores, a percentage of usually 10% is added to the cost of the material sold to Construction work orders.

CONSTRUCTION PLANT AND TOOLS: Included in this item are the Commission's Construction Plant, excepting that which is being operated on the Chippawa Development Works, and all small tools used for the construction of stations and lines, also including tools for general maintenance purposes.

In respect to the large plant, this is put on to a job on a rental basis at a certain figure for active time and a nominal charge for idle time, the job to bear the expense of its operation and ordinary maintenance of same. The rental is charged to the job monthly and distributed to the cost of the work in accordance with information supplied by the Field Office, the time of operation of each piece of plant being kept in the same manner as that of the labor employed. The rate charged per month is fixed by the Construction Department, and in arriving at their figure, due consideration had to be given to the carrying charges, overhead expense, lost time, extraordinary repairs (which would be capitalized), depreciation and market conditions. At the end of each fiscal year the plant is carefully gone over by a Plant Engineer, who, after taking into account market conditions, places a valuation upon same, and submits it to the Accounting Department. From this information, the books are adjusted, and the figure carried forward into the ensuing year represents what is considered to be a fair value of the plant on hand.

I might mention that each piece of plant has an individual operating account, thereby giving the engineer an opportunity of knowing all the facts in connection with the operation of same.

With regard to Small Tools, it has been our practice, as far as possible, to keep the cost of Small Tools out of the Construction cost, even though the life of some may be very short. By doing this we overcome the possibility of one job being charged with a number of small tools that are, at the completion of the work, moved off to another location, as without doubt, in the majority of cases, no credits would be entered for the value of those removed. To obviate this difficulty an account was opened, and is known as Construction Tool Account to which all small tools are charged, sub-divided under various headings, such as Line Tools, Station Construction Tools, Maintenance Tools, etc. At the end of each fiscal period an inventory is taken of all such equipment, and a valuation placed on same, based upon its condition and the current market prices.

The valuation thus obtained is then compared with the book value, and any difference between the figures submitted and the value as carried in our books, is written off and charged to all work performed during the year on a man-hour basis. That leaves the book value of our tools at the end of each year in balance with the value of equipment on hand, and ensures all jobs being charged with its correct proportion for use of this class of equipment.

OPERATION:

Having seen how our Fixed Assets, or Capital Cost, is built up, and the manner in which it is reflected in our books, the next thing for consideration is the operation of the plant installed.

Before a Municipality decides to become a member of this great family, it naturally wants to know what it will have to pay for the power delivered, and, in order to obtain this information much preliminary work has to be done, surveys have to be made, estimates of cost prepared and other engineering details attended to, with which you are probably familiar.

These estimates are passed along to the Rate Department, and with this information, together with data that they already have in their possession, they are able to arrive at a rate per horse power for the Municipality concerned. From this you will see how important it is that the figure quoted for the construction work should be as near to the actual cost as possible.

In dealing with the operation of a system it will be necessary to subdivide the different class of expense, which goes to make up the operating costs, under the following headings:—Operation, Maintenance, Administration, Cost of Power, Interest, Renewals, Sinking Fund and Contingencies, and deal with each item separately:

(a) *Operation*—Operators' salaries is the principal item so far as actual operation is concerned, in fact, you might say that it would represent about 80% of the total operating expense, the balance being for coal, water, waste, meter paper and other miscellaneous supplies. Each station has its own operating account, whilst the lines are divided into zones, and the expense of each zone is carried

separately. The accounting in both cases is similar to that described in the capital cost section.

(b) *Maintenance:*—As the word implies—keeping the plant in such shape that it can be efficiently and safely operated at all times—the labor charges and other expenses are handled in much the same manner as was described for the Capital Cost. Most of the supplies and repair parts being drawn from Stores, known as Maintenance Stores, which are distributed at various points throughout the system, so that in case of emergency they can be easily obtained, and with as little delay as possible. The material used for such purposes is reported to the central Storehouse at Hamilton, where same is priced, recorded in the Stores Record and the value of same transferred monthly to the maintenance cost of the station or line upon which it was used. The labor and other expenses for making the repairs are also distributed against the station or line, thus giving us at the end of each year the exact maintenance cost for each station or section of line.

There has been much controversy over the matter of maintenance as to where maintenance stops and renewals commence, and up to the present, so far as I know, no definite ruling has been given. My own opinion, however, is that a dividing point should be arrived at and strictly adhered to.

It seems to me that if a piece of plant has been continuously operating for the major portion of its natural life, and a part or the whole of same has given out under ordinary wear and tear, that the cost of replacing same whether it be large or small, could and should be charged against the Renewals Reserve account, or, as the Renewals rate is designed to meet the original cost only, and not the replacing cost, I would, when renewing small pieces of equipment, charge the equipment only to Renwals Account, and the labor installing same to Maintenance; but in case of renewing the larger equipment, I would charge the capital cost with same, plus cost of installing, and write off the original cost of old equipment, together with the cost of its installation to Renewals Reserve.

You will note there is a discrepany in my method, but I do not think there is any justification for disturbing the capital cost of a station or line, when the amount involved is small, especially, if the equipment renewed is of the same capacity as the old. If the charge, however, is of a trivial nature, and its effect upon the stations or lines operating cost is small, discretionary power could be given to the parties interested as to what they would do with such an expense. As the matter now stands, there are undoubtedly a number of items that are charged to Maintenance, that could be placed against the Renewals Reserve, and the Operating expense for that year be relieved to some extent.

There is, however, another side to the question. The Renewals rate for electrical equipment is based more or less on theory, and there may reasonably be some doubt as to whether the

amount taken from the revenue yearly, and set up as a reserve, will be sufficient to replace the equipment as it becomes used up. Judging by the size of our Renewals Reserve, however, it would seem that we are pretty well covered. So far as our own Plant is concerned, only a small portion has operated anything like half its natural estimated life, but in cases where same has been in operation for the major portion of its life, such as Poles and Insulators, I am told, especially so far as the Poles are concerned, that they are standing up well, and are likely to last much longer than their estimated life.

(c) *Administration:* Consisting of salaries and expenses of the Head Office operating department, together with a correct proportion of the Administrative Office expense, Executive Salaries, etc., which are carried under special accounts throughout the year; and then, at the end of each fiscal period, distributed pro rata to the operating and maintenance cost of each station and section of line.

(d) *Cost of Power:* The Commission at the present time is buying power for the Niagara System from many sources, and at various rates. The amount paid, however, is lumped, and at the end of the year, distributed against the Municipalities and Companies served pro rata to the average horse power consumed. Therefore, all users of power in the Niagara System are assessed at the same rate for power delivered to our station at Niagara Falls. The ultimate cost per horse power depends upon distance, operating conditions and quantity taken.

(e) *Interest, Renewals and Sinking Fund:* Inasmuch as important items of the annual cost to be borne by a system consist of interest, sinking fund requirements and reserves for renewals of works and equipment, all of which are based upon the amount of capital invested, it is necessary to determine the amount of the share capital invested in the system, which has to be supported by each municipality before its proportion of such charges can be ascertained. This is determined by allocation to it of a share of the total capital cost of the stations and lines to the point of delivery of power to it, which share is equal in proportion to the amount of power taken by it, as compared with the total power passing through the lines at such point of delivery.

As an illustration, let us take the Municipality of Guelph. Guelph would take its proportionate share, such share being determined by taking the percentage of Guelph's average load to the Niagara System's average load, of the cost of Commission's Power Lines from Power Companies to Niagara Station, Niagara Transformer Station and 110,000 volt equipment, High Tension Lines from Dundas Station and 110,000 volt equipment, High Tension line from Dundas to Guelph, Guelph Transformer Station and 110,000 volt equipment, and the whole of the local transmission line from Guelph High Tension Station to the Guelph Municipal Substation. In other words, a

share of the cost of all equipment that Guelph's load has passed through.

With the amount of capital for which it is responsible so ascertained, each municipality is then charged with:—Interest, Renewals and Sinking Fund.

(1)—*Interest*—Computed on the cost of all operating equipment at a figure usually 4½% to 5%, sufficient to absorb the amount paid, or balance of the amount paid to the Provincial Government for interest on monies borrowed from the Province, non-operating capital having previously been charged at current rates with its share of the interest paid.

(2) *Renewals* — The Commission is empowered to retain and set aside out of revenue such sums of money as may in its opinion be sufficient to provide for the renewal, alteration and repair to works constructed and operated by the Commission. Having regard to these provisions, the Commission has made numerous enquiries, studied the rates and theories of other large electrical systems, as to the annual depreciation in, and the life of, and the residual value of works, lines and equipment. From the information thus obtained, and from its own experience, the Commission has applied rates of depreciation, and arrived at a flat rate to be charged annually against each Municipality. The rate, which is 2½% of the System's capital cost, Right of Way cost expected, is on a Sinking Fund basis, the interest improvement being at 4% per annum.

(3) *Sinking Fund*—The Commission is also empowered to retain and set aside out of revenue an annual sum sufficient to form in thirty years, with interest at the rate of 4% per annum, a sinking fund for the repayment of the advances made by the Province. No Municipality is charged, however, with sinking fund until it has been operating five years time, thus giving it a chance to connect up a good load, and be in a better position to meet this additional demand.

The assessment to each Municipality is at the rate of 1.8% per annum based on the proportionate share of capital it is responsible for.

(f) *Contingencies:* In view of the fact that it is impossible or rather unprofitable to place insurance on electrical equipment, the Commission has in its wisdom created a Contingency Fund to meet losses by fire, explosion and other unforeseen damages. To create this fund the municipalities are assessed yearly at the rate of 25c per average horse power consumed, and this, together with the profits from sale of power to companies in the system, is placed to the Contingency Reserve account.

In addition to such losses as mentioned above, this Contingency fund is used for the purpose of absorbing losses made through the transfer of equipment from one point to another, reference to which has previously been made.

The items mentioned, viz: Operation, Maintenance, Administration, Interest, Cost of Power, Renewals, Sinking Fund and Contingencies embrace practically all expenses for the operation of a system, and I have shown the method of proportioning

all these charges excepting Operating and Maintenance expense. This class of expense, as I previously stated, is distributed as it is made against each individual station or section of line, and accumulated there until the end of each fiscal year.

The proportioning of this expense is similar to that described for the Capital Cost, viz: the Maintenance and Operating costs of stations and lines such as Niagara Station and transmission lines between Niagara and Dundas, which are common to all municipalities in the Niagara System, is proportioned to the Municipalities and Companies pro rata to the average horse power consumed by them, for instance, Windsor, which is at the extreme end of the system would take a share of all Maintenance and Operating expense of all 110,000 volt equipment, stations and lines with the exception of the lines and stations east of Dundas. This share of the expense would be determined by taking the percentage of Windsor's average load to the system's average load. In other words, Windsor has to bear a share of the operating and maintenance cost of all equipment through which the power supplied to them has passed. Similarly all municipalities, no matter where they are situated, are charged according to the percentage of their load to the system's total load with the operating and maintenance cost for high tension stations and trunk lines, through which their power passes, together with the total expense of the local line and distributing station, they being the only interested party, so far as the latter are concerned.

Having determined the various classes of expense that are to be made against each Municipality, these expenses are accumulated and represent the actual cost of delivering power to the Municipality's sub-station, and the total is applied against the revenue received during the year from the Municipality, and it is then, and then only, that the Commission can be absolutely sure whether a Municipality has been paying enough for its power during the year.

In the event of the revenue received from the Municipality for the sale of power being more, and up to now that has been the rule rather than the exception, than the cost of power as ascertained by annual adjustment, the surplus is refunded, thereby leaving the Municipality charged with the actual cost only. On the other hand, should the revenue be less than the actual cost of delivering power, an additional bill, known as the thirteenth power bill, is rendered for that shortage. Thus it will be observed that each Municipality is called upon to pay the actual cost only of delivering the power.

According to official reports births in England and Wales in 1920 were the highest ever recorded, and the death rate the lowest.

Tuberculosis among miners has decreased since the introduction of electric power into the South African gold mines.

Results of Primary Ballot, A. M. E. U.

THE report of the scrutineers on the primary ballot for election of officers for the year 1922, has been placed in the hands of the Secretary, a copy of which, omitting the number of votes received is given in the following.

The names marked with an * will appear on the election ballots. The election ballots will be distributed at the time of registration for the January Convention, and will be marked and returned before the close of the afternoon session of the first day of the Convention. The scrutineers will make a report of the results of the election during the morning session of the second day of the Convention.

November 22, 1921.

Mr. S. R. A. Clement,
Secretary

Association Municipal
Electrical Utilities.
190 University Ave., Toronto.

Dear Sir;—

In accordance with the request of the President of the A.M.E.U. we, the undersigned, have acted as Scrutineers for the primary Ballot for the election of officers of the Association for the next year.

The results of the primary Ballot are submitted herewith in tabulated form.

In accordance with the Constitution, the Ballot to go before the Convention for election of officers as determined from the primary Ballot is also submitted herewith.

Yours truly,

T. C. James.

A. W. J. Stewart

Results of Primary Ballot for Election of Officers

PRESIDENT

*Martindale, R. H.
*McHenry, M. J.
Catton, W. R.
McIntyre, V. S.
Perry, O. M.
Couzens, H. H.
Scott, O. H.
Sifton, E. I.

VICE-PRESIDENT

*Perry, O. M.
*Hicks, A. T.
Martindale, R. H.
McIntyre, V. S.
Shearer, H. F.
Archibald, J. G.
Starr, R. H.
Heeg, J. J.
Yates, P. B.
Stapleton, E. J.
Catton, W. R.
Sifton, E. I.
Couzens, H. H.
McHenry, M. J.
Staford, R. H.

Mahony, E. J.
Reesor, W. E.

SECRETARY

*Clement, S. R. A.
*Hillman, H. P. L.

TREASURER

*Mickler, G. J.
*McCollum, R. C.

DIRECTORS AT LARGE

*Yates, P. B.
*Scott, O. H.
*Starr, R. H.
*Buchanan, E. V.
*Jackson, J. G.
*McIntyre, V. S.
*Couzens, H. H.
McHenry, M. J.
Skidmore, J. E.
Heeg, J. J.
Archibald, J. G.
Brown, J. E.
Sifton, E. I.
Perry, O. M.
Catton, W. R.
Martindale, R. H.
Reesor, W. E.
Stapleton, E. J.
Phelps, J. E. B.
Caughill, E. H.
Smith, R. J.
Adsett, F. C.
Timmerman, H. E.
Teckoe, J. E.
Milliken, S.
Shearer, H. F.
Stewart, A. W. J.
Elliott, R.
Sanderson, W. K.
Fisk, H. O.
Buchanan, J. V.
Mahony, E. J.
Smith, A. A.
Dean, M. G.
Ross, James
Bateman, Dr.
Blay, G. W.
Bain, G.
Longworth, Percy
McLinden, J.
Hicks, A. T.
Ashworth, E. M.
Inglis, M. M.
Pocock, P.
Staford, R. H.
Daykin, W.
Kelley, J. B.

Note; V. S. McIntyre and H. H. Couzens—equal vote.

DISTRICT DIRECTORS

NIAGARA

*Heeg, John J.
*Archibald, J. G.
Sifton, E. I.
Yates, P. B.
Perry, O. M.
Phelps, J. E. B.
Jackson, J. G.
Catton, W. R.
Daykin, W.
Buchanan, E. V.
Myers,, R. H.
Hall, H. G.
Lang, A. G.
Fralick, J C.
Elliott, R.
Smith, A. A.

CENTRAL

*Reesor, W. E.
*Adsett, F. C.

*Ferguson, W. G.
*Walters, C. A.
Hicks, A. T.
Coleman, V. B.

Note; F. C. Adsett,—W. G. Ferguson, C. A. Walters, equal vote.

GEORGIAN BAY

*Stapleton, E. J.

*McLinden, J.
Elliott, H. B.

EASTERN

*Brown, J. E.

NORTHERN

*Inglis, M. M.
*Staford, R. H.

Minutes of Executive Meeting, A. M. E. U.

THE meeting was called to order at 10.15 A.M. in room 312 at the office of the Hydro-Electric Power Commission of Ontario, by the President.

Those present were Messrs. M. J. McHenry, President, R. H. Martindale, R. H. Starr, E. J. Stapleton, A. T. Hicks, P. B. Yates, O. H. Scott, H. F. Shearer, H. H. Couzens, G. J. Mickler, T. C. James, L. G. Ireland, R. T. Jeffery, J. J. Jeffery and S. R. A. Clement, Secretary.

Moved by Mr. O. H. Scott, seconded by Mr. R. H. Martindale.

That the minutes of the last Convention of the Association be passed as published.

Carried.

By a resolution passed at the June Convention at Niagara Falls, the proposed legislation by Mr. Swaze, to license electrical contractors was referred to the Executive for consideration. This matter was discussed at some length.

Moved by Mr. O. H. Scott, seconded by Mr. P. B. Yates.

That the Executive Committee report back to the Association at its next Convention, that it does not approve of the present bill, in that under present conditions it is unnecessary and that it would not be in the interest of the electrical industry at large or of the general public.

Carried.

Correspondence in reference to the formation of a Dominion Organization was read.

Moved by Mr. H. F. Shearer, seconded by Mr. P. B. Yates.

That consideration of the proposed Dominion Organization be postponed pending the decision of an informal meeting to be held to discuss this matter.

Carried.

The President advised of the Committee that had been formed to confer

with the Hydro-Electric Power Commission of Ontario, on merchandising and of the work that had been done.

Moved by Mr. R. H. Starr, seconded by Mr. E. J. Stapleton.

That the action of appointing a Committee to confer with the Hydro-Electric Power Commission of Ontario on merchandising is indorsed by the Executive, and that the Association appoint a standing Committee to work in conjunction with the Hydro-Electric Power Commission of Ontario on merchandising.

Carried.

Moved by Mr. A. T. Hicks, seconded by Mr. R. H. Starr.

That an amendment to the Constitution and By-Laws be submitted to the next Convention to empower the Executive Committee to institute Standing Committees from time to time and to appoint committees to act pro tem until the succeeding annual election.

Carried.

Moved by H. F. Shearer, seconded by Mr. O. H. Scott.

That the following manufacturers be accepted as Commercial Members of this Association.

Canadian Ironing Machine Co. Limited—Woodstock.

The Coffield Washer Co. of Canada Ltd.—Hamilton.

Earl Electric Limited—Toronto.

Easy Washing Machine Co.—Toronto.

Electric Refrigerators, Limited—Toronto.

The National Equipment Co. Limited—Toronto.

R.E.T. Pringle Limited—Toronto.

The Robbins & Myers Co. of Canada Ltd.—Brantford.

The Slade Mfg. Co. Limited—Owen Sound.

Square D Company, Walkerville.

Carried.

The report sent in by the Treasurer showed a balance on hand of $967.43.

Plans for the Winter Convention were considered.

Moved by Mr. A. T. Hicks, seconded by Mr. R. H. Starr.

That the next Convention be held at Toronto on January 26th and 27th, 1922, and that arrangements for this Convention be left to the Convention Committee, these to include a theatre party after the Convention dinner.

Carried.

In the absence of Mr. H. H. Couzens, Chairman, Papers Committee, Mr. R. T. Jeffery presented a report giving suggestions for papers to be read at the Convention.

Moved by Mr. O. H. Scott, seconded by Mr. A. T. Hicks.

That the following papers be presented at the January Convention of the Association.

1. Further developments in Rural Power Distribution by Mr. J. W. Purcell.

2. The Effect of Underloaded Transformers on System Power Factor, (contributor to be named.)

3. The measurement of Kilovolt Amperes for Power Billing, by Mr. S. L. B. Lines

4. The Development of the St. Lawrence River by Mr. A. V. White.

Papers 2 and 3 to be read concurrently and followed by a joint discussion.

Carried.

Mr. R. H. Starr, Chairman, Regulations and Standards Committee, reported on difficulties arising out of the application of optional rulings of the Electrical Inspection Department.

Moved by Mr. H. F. Shearer, seconded by Mr. R. H. Martindale.

That the Chairman of the Regulations and Standards Committee take up the matter of uniformity of the Rules and Regulations with the Chief Electrical Inspector.

Carried.

Mr. P. B. Yates brought up the question of the formation of a Committee to confer with the Commission on changes in the form of rates to meet changing conditions.

Moved by Mr. P. B. Yates, seconded by Mr. E. J. Stapleton.

That the Executive Committee of this Association feels a very strong need for co-operation in the matter of rates and instructs Mr. R. T. Jeffery to take up with the Hydro-Electric Power Commission of Ontario the question of calling together a Committee from the Association of Municipal Electrical Utilities to co-operate with the Commission in the question of changes in the form of rates to meet changing conditions; that this Committee co-operate with the Rate Committee of the Hydro-Electric Power Commission of Ontario and be formed after plans similar to the Committee on Merchandising.

Carried.

Moved by Mr. O. H. Scott, seconded by Mr. R. H. Starr.

That the Secretary be instructed to write a letter of sympathy to Sir Adam Beck on behalf of the Association.

Carried.

A copy of a memorial of the Canadian Electrical Association to be submitted to the Dominion Government, asking that the re-seal period for meters be extended from five years to ten years was read and discussed.

Moved by Mr. O .H. Scott, seconded by Mr. R. H. Starr.

That the Executive Committee of the Association of Municipal Electrical Utilities concurs in the memorial of the Canadian Electrical Association drawn up in reference to the testing of meters, and that the memorial be circulated among the various Municipal Utilities with the recommendation that they sign and seal the same to be forwarded to Ottawa.

Carried.

Moved by Mr. R. H. Martindale, seconded by Mr. H. H. Couzens.

That the President be authorized to appoint a small committee to co-operate with the Committee of the Canadian Electrical Association in carrying out this resolution.

Carried.

The meeting adjourned at 12.30 P.M.

The Executive Committee met again at 4.15 P. M. when the following resolution, passed by a meeting of representatives from the various electrical societies was discussed:

"That in the opinion of the electrical men here gathered together, it is advisable to endeavor to form one Electrical Association for all of Canada and that with Dr. Carr as convener we suggest that an invitation be sent to the various electrical organizations to send three representatives to a meeting to form tentative arrangements for such an organization."

Moved by Mr. R. H. Starr, seconded by Mr. R. H. Martindale.

That Messers. M. J. McHenry. O. H. Scott and P. B. Yates be appointed representatives from this Association to act with Dr. Carr in taking up the question of forming a Dominion organization.

Carried.

The meeting adjourned at 4.30 P.M.

The Testing of Flexible Insulation

TESTS on insulations, whether the latter be flexible or otherwise, are made to determine if the insulation is satisfactory for the use which is to be made of it. The first consideration therefore, must be to determine the uses of the insulation on which tests are to be made and then to make only those tests which will determine if the samples tested are satisfactory for the purpose intended.

Flexible insulating materials naturally divide into two classes, first, those which will resist comparatively high temperatures, and second, those which can only be subjected to relatively low temperature without loss of insulation properties and mechanical strength.

The two most important materials belonging to the first class are built-up mica, in the form of sheets or tape, and asbestos tape. These will resist high temperatures, but both have very little mechanical strength. Tests on these materials are of a special nature, and are usually made on the insulation after it has been placed on the conductor or coil on which it is to be used. Such properties as thermal conductivity, flexibility, dielectric strength and resistance to high temperatures may be determined in this way.

The remaining materials used in flexible insulations are all made up, in whole or in part, of vegetable fibres, which thus limits the temperature they will withstand to that above which charring of vegetable matter commences. This temperature is approximately 100°C, and at temperatures higher than this disintegration of the material commences, with consequent loss of mechanical and dielectric strength.

The most important flexible insulations of the above class are:—

Rubber, and rubber components
Varnished Cambric cloth and tape
Cotton cloth and tape
Paper, impregnated or plain.

Rubber is used in a variety of ways as insulation, e.g. for gloves and mats as protection against high voltage; as a covering for conductors, or as an insulating and adhesive compound in rubber insulating tape. The physical properties of rubber are not very definitely known, but a few simple tests usually indicate whether the insulating materials of which rubber is a part, are satisfactory or otherwise.

The tests which should be made on rubber insulation as applied to cables are as follows:—

(1) Thickness.

Accurate measurements of thickness of insulation covering are necessary to obtain some idea of the protection which the insulation will give to puncture. A variation of 10 per cent is allowable in this dimension.

(2) Chemical Properties and Tests.

Chemical tests are made to determine the composition of the insulating wall, and to insure that only a limited quantity of undesirable compounds or fillers are present. A good insulation should contain only Hevea rubber which has not been previously used, waxy hydrocarbons, sufficient sulphur to insure proper vulcanization and fillers which are entirely inorganic mineral matter, containing no red lead carbon, or bitumen.

(3) Physical Properties and Tests.

The tests usually made on samples of the insulation of cables are:

(1) Tensile strength.
(2) Set
(3) Elongation.

For these tests, representative samples of the insulation about 6 inches in length are obtained, and bench marks made 2 inches apart in the centre section of each sample. After carefully measuring the area of cross section at the centre section, the sample is placed in the testing machine (Figure 1) and stretched at a uniform rate—until the distance between the bench marks is six inches. The test specimen is released within five seconds and the set determined 1 minute after the beginning of release. The set should not be greater than three-eighths inch in two inches.

To determine the elongation, the specimen is placed in the testing machine and streched at a uniform rate until rupture occurs, noting the distance obtained between bench marks at the point of breaking. This should not be less than nine inches. This test also gives the breaking load, from which, with the cross sectional area, the tensile strength can be determined.

(4) Electrical Properties and Tests

The electrical tests usually made are to determine the dielectric strength and insulation resistance. These tests can be most conveniently made at the place of manufacture, the voltages for various thicknesses, insulation, and method of test being as laid down in the Standardization Rules of the American Institute of Electrical Engineers.

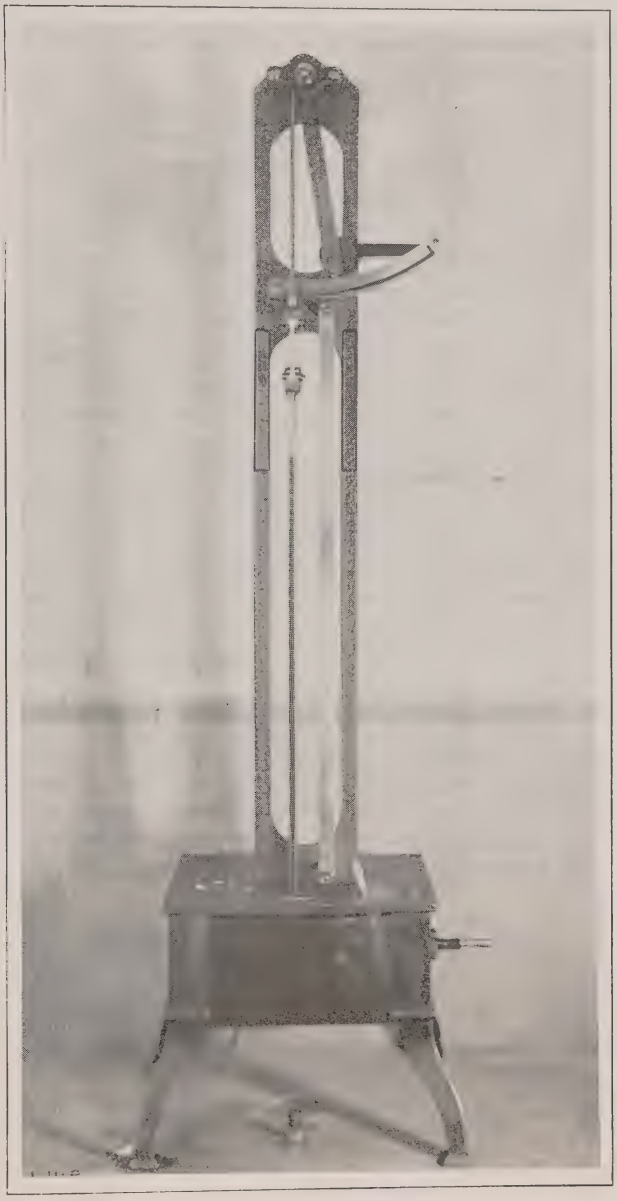

Figure 1.

Rubber Insulating Tape.

Rubber insulating tape is used for insulating joints in electric wires and cables. Tests made on this tape are chiefly to determine quality and uniformity of the product.

Inspection of a sample roll of tape will usually detect undesirable features. The defects to be looked for are unevenness in calendering, non-uniformity of width, and tendency to stick to the linen backing.

Chemical Properties And Tests

The same limitations apply as specified above for the rubber insulation for cables. A good tape should contain not less than 30 per cent Hevea rubber, not more than 1 per cent free sulphur, nor more than 4 per cent of waxy hydrocarbon.

Tensile Strength.

This is determined in the testing machine shown in Figure 1, and should not less than 300 pounds square inch.

Dielectric Strength.

This is determined by testing between electrodes such as those shown at A, Figure 11. The tape should withstand a potential of 10,000 volts r.m. s. for a period of five minutes.

Fusion Test.

As this tape is applied by wrapping, and then heating until a homogeneous mass is obtained, a test is usually made to determine this property. The tape is wrapped to a thickness of ¼ inch, and heated to a temperature of about 65°C for 20 minutes at the end of which time to be satisfactory it should have fused into a homogeneous mass.

An important test is one made to determine the economy of tape. It is desirable to obtain as many yards as possible of the tape per pound of material consistent with satisfactory dielectric and mechanical strength. The yardage of tape varies over a considerable range and any tests are not complete unless a test to determine the yardage is included. A new roll of tape from which only the case and wrapping has been removed, is weighed, and two or three samples several feet in length are removed, and their length and weight found. From these readings the length of tape per pound of material is obtained, the results from this test may be quite surprising, showing variations which may be large enough to warrant buying a tape which may be quoted much higher per roll than another having less yardage.

Friction Tape

Closely allied to rubber tape is adhesive or friction tape, and many of the tests made on the latter are similar to the ones given above. Friction tape is an adhesive tape made of cotton sheeting impregnated with an adhesive insulating compound.

Inspection of a sample roll of the tape should be made to determine the presence of dirt, knots, lumps or irregularities of twist. A common defect in friction tapes is to have the edge of the tape unravel as pieces are

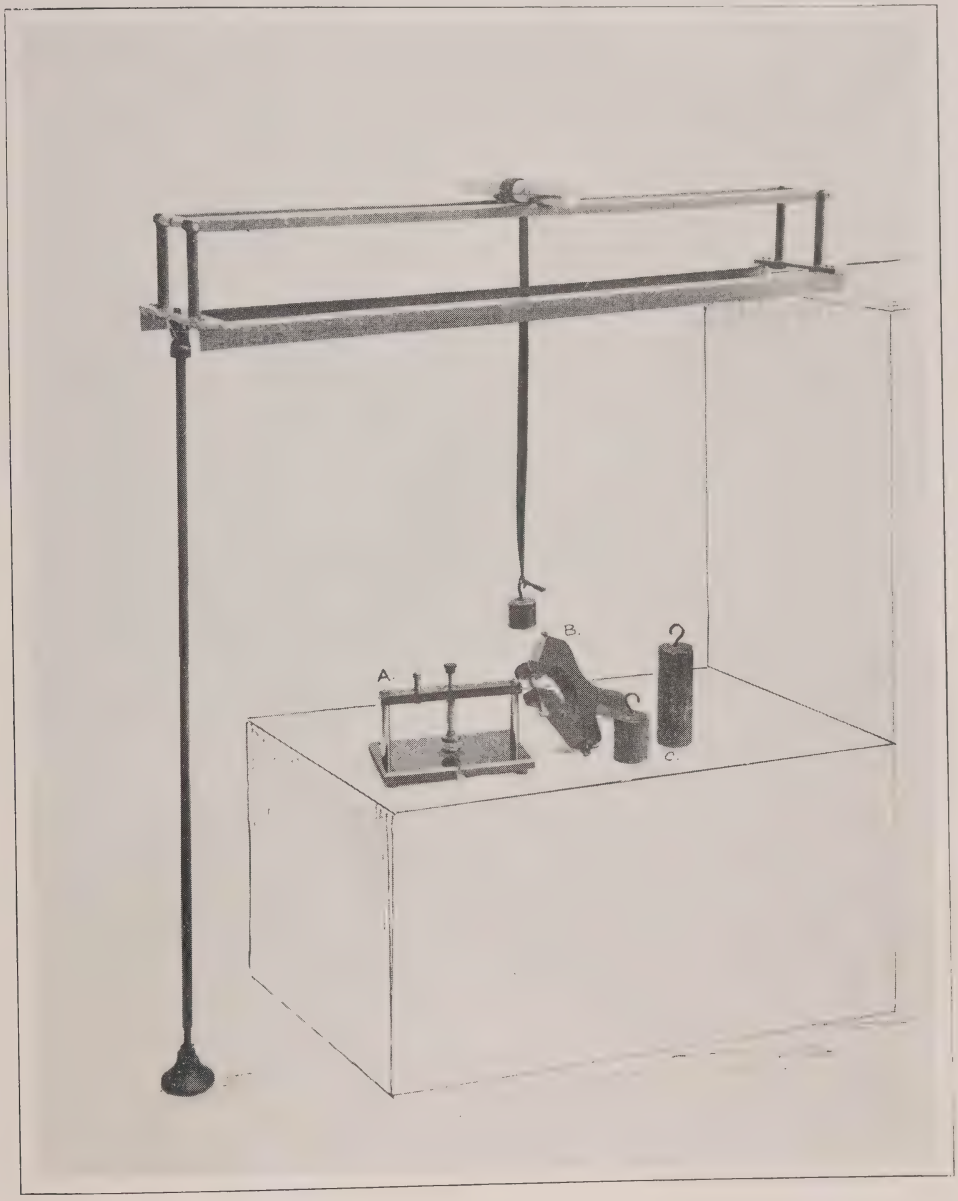

Figure 2.

being removed from the roll, and any tendency of this kind should be noted. The compound should be evenly distributed over both sides of the tape, and should not leave bare spots as the tape is unrolled, by pulling away from the fabric due to non-uniform sticky qualities.

Physical Properties And Tests.

Due to imperfect impregnation, friction tapes often show pinholes, so that in cases where the tape is expected to have considerable insulating properties, a sample should be held before a strong light, to detect the presence of any great number of these holes. A maximum number of three holes is allowable per yard of tape, but a well impregnated tape will usually have a much smaller number or none at all.

The tensile strength of the tape is measured in the machine shown in Figure I, and should be not less than forty pounds per inch of width.

Adhesion

The adhesion between adjacent layers of the tape is determined by winding a sample of the tape on a mandrel 1 inch in diameter under a tension of ten pounds per inch of width at a rate approximately thirty inches per minute. A weight of four pounds per inch of width is then attached and this shall not cause the plies to separate at a rate in excess of thirty inches per minute. The apparatus required for this test is shown in Figure II, which also shows at A and B, two types of electrodes for testing the dielectric strength of flexible insulation. The electrodes at A are used where the width of the insulation is sufficient to allow specimens to be tested in air without flashover occurring. The electrodes and attachements at B are suitable for testing tapes and specimens of limited width under oil, and the shape is such that the terminals of the oil testing machine in use in the Laboratories can be used by simply removing the oil cup and substituting the test electrodes, which dip into a suitable receptacle containing oil.

Some friction tapes have a tendency to dry out quickly, and so lose their frictioning qualities. A test to determine any tendency to dry out too quickly involves placing the samples in a baking oven at 100° C for sixteen hours, and then testing in the machine shown in Figure II. The tension applied when wrapping the tape on the mandrel is the same as in the adhesion test previously described, but the weight to unroll the tape is reduced to 1-1/3 pounds per inch width of tape.

Dielectric Strength

The dielectric strength may be determined by puncturing samples of tape between specified types of electrodes, or by impressing a given potential of approximately 1,000 volts at a frequency not exceeding 65 cycles per second for five minutes on a sample wrapped with one-third lap on a one-inch mandrel. The tape is considered satisfactory if it will withstand this potential. The latter test is consistent with tests made for dielectric strength of apparatus, and indicates

the tendency nowadays to omit tests to destruction wherever possible.

Yardage

The test for economy of tape is similar to that described for rubber tape, and is of importance in establishing the length of tape obtained per pound of material. This test should never be omitted where comparative tests of tape are made with a view to purchase of a suitable brand.

The only chemical test of importance on friction tape is to determine the percentage of free sulphur. The presence of sulphur can be determined by wrapping a sample of the tape on a clean copper rod and baking for twelve to twenty hours in an oven at 100° C. The sulphur will discolor the copper, and if the discoloration is marked, the quantitative analysis may be made. The amount of free sulphur should be less than 0.05%.

Varnished Cambric

The tests usually made on varnished cambric include:

1. Tensile Strength. 2. Dielectric Strength. 3. Heat resisting properties. 4. Solvency in oil.

The tensile strength and dielectric strength are measured with apparatus shown in Figures I and II respectively, and the heat resisting qualities by baking samples of the cambric in an oven at 100° C for various lengths of time, and noting any tendency to brittleness. Inspection is usually made after 50, 100, 200, 300, 400 hours, after which time any tendency to brittleness will usually have appeared.

The solvency in oil is determined by placing a sample of the cambric in transil at 100° C for twenty-four hours and noting whether the varnish film has been destroyed or attacked by the hot oil. A good cambric impregnated with the proper varnish should have the varnish film unimpaired, and there should be no tendency to peel or blister.

All of the above tests are made to determine the fitness of the insulation for use generally, and if some special use is to be made of a given insulation, the above tests may not cover all points, in which case additional tests must be made to determine more accurately the suitability of the material. Familiarity with the results that might be expected of a given insulation assists greatly when tests such as those described above are made, and any unusual behavior of the insulation should be noted, as any knowledge of this kind often explains what might otherwise appear to be a very unusual characteristic. None of the tests described above are difficult to make, but the results obtained from them are of much greater value if accompanied by general observations of the behavior of the insulation under test, and a note made of anything which appears unusual.

Dividing the cubic measurement in inches of a block of ice by 30 gives its approximate weight in pounds.

An electric attachment enables an alarm clock to be used to make long time exposures with cameras.

Announcement

The readers of THE BULLETIN will be interested to know that Mr. George J. Mickler has been placed in charge of the Commission's Sales Department.

Mr. Mickler is well known throughout the Province through his activities as Assistant Municipal Auditor, and has personal acquaintanceship with the Municipal Officials in nearly every Hydro Municipality in Ontario.

His educational training and commercial experience provide him with a secure foundation on which to rear the structure of a successful Sales Department, and his personality gives every reason for assurance that the Commission's clearly defined policy of the most complete co-operation between all the members of the Hydro family will be fully realized.

It is Mr. Mickler's ambition to carry out to a successful issue the Commission's policy of the highest type of merchandizing service under conditions beneficial and satisfactory to the earnestly bespeaks the support of the municipalities, and THE BULLETIN Municipal Officials in his effort to attain this object.

Canada's average wheat yield for ten years (1909-18) was 18.25 bushels per acre.

HYDRO NEWS ITEMS

Niagara System

GENERAL—The Municipalities of Ford City, Riverside, Tecumseh and St. Clair Beach are making preparation to submit Hydro enabling and money by-laws to the ratepayers at the coming municipal elections. The formation of the Municipalities of Riverside and St. Clair Beach and the enlargement of the boundaries of the Village of Tecumseh has made this step advisable. It is proposed that these four municipalities will be supplied with power from the Walkerville Sub-Station and that the four systems will be operated by the Walkerville Hydro-Electric System, separate accounts and records being kept for each municipality.

GALT—The Public Utilities Commission is erecting a new combined sub-station and office building. The building will be completed shortly after the first of the year and the sub-station equipment should be installed and in operation by March 1st. The building is suitably located and has a very handsome appearance, being constructed of brick with a stone front. Particular attention has been given to the design of a suitable showroom in the office building for use in connection with the sale of appliances.

NIAGARA FALLS—The Hydro-Electric System here has made arrangements for the erection of a new sub-station. The new station will be located more nearly in the centre of load distribution than the present one, which has become inadequate to take care of the rapidly increasing load. The design of the building is being taken care of by a local architect, while the purchase and installation of electrical equipment is being handled by the engineers of the Commission.

SCARBORO TOWNSHIP—The township is submitting Hydro enabling and money by-laws to the ratepayers at the coming municipal elections. Up to the present time the primary lines in Scarboro Township have been financed by the Provincial Commission, and it is proposed that the southern portion of the township be operated as an urban municipality and that the township should entirely take care of the financing in connection with the system.

WALKERVILLE—The Hydro-Electric System has recently purchased a site on which it is proposed to erect a new offiice building. The new site is in a very desirable location, and the

building will be suitable both for an office building and a sales department for the sale of appliances. It is expected that the construction of the building will be commenced shortly after the first of the year.

Severn System

GENERAL—Due to the fact that the Big Chute development which serves the Severn System is loaded to capacity, investigations are being made at the present time by the Commission's Engineers covering improvements and extensions to the plant. In all probability during the coming year about 2,500 horse power additional will be required to serve the various towns and municipalities on the Severn System.

BARRIE—The installation of two additional 350 K.V.A. transformers has just been completed by the Commission in the Barrie sub-station to take care of the increased demands in this municipality. The Barrie station has now a capacity of approximately 1,400 K.V.A.

INNISFIL TWP.—The Commission has been endeavoring to arrange for rural service in this township and a large number of public meetings have been held at different hamlets and in various localities to explain the advantages of electrically equipped farms and to submit information in general to the farmers.

The indications are at the present time that this township will be organized on a large scale in the near future and in all probability lines will be constructed throughout same during the coming year.

MIDLAND—Rapid progress is being made on the installation of equipment for the Copeland Flour Mill sub-station, which will take energy at 22,000 volts from the Midland transmission line and step-down to 550 volts for the purpose of serving the new flour mill being constructed by Mr. A. Copeland. This mill will start off with about 400 horse power demand with a possibility of the load being increased at a later date.

The mill will be in operation about February 1st.

NOTTAWASAGA TWP.—The construction of a rural line in Nottawasaga Township from Collingwood to Duntroom, consisting of approximately seven miles, is being undertaken by the Commission at the present time for the purpose of serving a large group of farmers in the township. Power will be taken from the Collingwood System and metered at the boundary of the municipality.

This contitutes the first rural system on the Severn System, but it is expected in the course of the next year that various other similar rural systems will be constructed throughout Simcoe County.

HYDRO MUNICIPALITIES

NIAGARA SYSTEM

	Pop.
Acton	1,563
Ailsa Craig	486
Ancaster	400
Ancaster Twp.	4,058
Aylmer	2,247
Ayr	802
Baden	710
Barton Twp.	6,382
Beachville	503
Biddulph Twp.	1,623
Blenheim	1,490
Bolton	587
Bothwell	680
Brampton	4,270
Brantford	32,159
Brantford Twp.	6,741
Breslau	500
Brigden	400
Burford	700
Burford Twp.	3,778
Burgessville	300
Caledonia	1,265
Chatham	15,182
Chippawa	1,172
Clinton	1,809
Comber	800
Copetown	230
Dashwood	350
Delaware	350
Dereham Twp.	3,200
Dorcester	400
Dorchester S. Twp.	1,376
Drayton	600
Dresden	1,411
Drumbo	375
Dublin	218
Dundas	5,009
Dunnville	3,517
Dutton	860
Elmira	2,392
Elora	1,205
Embro	437
Etobicoke Twp.	7,281
Exeter	1,445
Fergus	1,710
Flamboro E. Twp.	2,499
Forest	1,422
Galt	12,434
Georgetown	2,121
Glencoe	824
Goderich	4,220
Grantham Twp.	3,456
Granton	300
Guelph	17,032
Hagersville	1,072
Hamilton	114,766
Harriston	1,340
Hensall	721
Hespeler	3,000
Highgate	371
Ingersoll	5,385
Kitchener	21,056
Lambeth	350
Listowel	2,551
London	59,100
London Twp.	6,073
Louth Twp.	2,312
Lucan	620
Lynden	622
Markham	836
Merritton	2,553
Milton	1,800
Milverton	1,044
Mimico	2,887
Mitchell	1,656
Moorefield	335
Mount Brydges	500
New Hamburg	1,370
New Toronto	2,696
Niagara Falls	14,207
Niagara-on-the-Lake	1,918
Norwich	1,271
Norwich N. Twp.	1,879
Norwich S. Twp.	1,888
Oil Springs	473
Otterville	400
Palmertson	1,890
Paris	4,320
Parkhill	1,213
Petrolia	2,863
Plattsville	500
Point Edward	1,037
Port Colborne	3,235
Port Credit	878
Port Dalhousie	1,447
Port Stanley	717
Preston	5,184
Princeton	600
Ridgetown	2,150
Rockwood	520
Rodney	686
Sandwich	3,643
Sarnia	12,649
Scarborough Twp.	7,843
Seaforth	2,015
Simcoe	3,756
Springfield	420
St. Catharines	19,195
St. George	600
St. Jacobs	400
St. Mary's	3,886
St. Thomas	17,759
Stamford Twp.	4,000
Stratford	18,106
Strathroy	2,637
Streetsville	525
Tavistock	876
Thamesford	388
Thamesville	804
Thorndale	250
Tilbury	1,619
Tillsonburg	2,856
Toronto	499,278
Toronto Twp.	5,234
Townsend Twp.	2,988
Vaughan Twp.	4,184
Walkerville	6,279
Wallaceburg	4,067
Waterdown	791
Waterford	1,084
Waterloo	5,476
Waterloo Twp.	6,475
Watford	1,033
Welland	9,135
West Lorne	787
Wellesley	583
Weston	2,570
Windsor	31,629
Woodbridge	587
Woodstock	10,126
Wyoming	503
York Twp.	44,232
Zurich	457
Total—	**1,191,736**

SEVERN SYSTEM

Alliston	1,264
Barrie	6,775
Beeton	571
Bradford	885
Camp Borden	.....
Coldwater	595
Collingwood	7,262
Cookstown	635
Creemore	612
Elmvale	600
Midland	6,532
Orillia	7,854
Penetang	3,811
Port McNicoll	531
Stayner	915
Thornton	200
Tottenham	469
Victoria Harbor	1,441
Waubaushene	600
Total	**41,552**

WASDELL'S SYSTEM

Beaverton	949
Brechin	225
Brock Twp.	2,795
Cannington	838
Eldon Twp.	2,047
Gamebridge	70
Kirkfield	138
Mara Twp.	2,000
Sunderland	570
Thorah Twp.	1,084
Woodville	434
Total	**11,150**

NIPISSING SYSTEM

Callander	650
Nipissing	100
North Bay	10,163
Powassan	510
Total	**11,423**

MUSKOKA SYSTEM

Gravenhurst	1,437
Huntsville	2,160
Total	**3,597**

EUGENIA SYSTEM

Alton	450
Artemesia Twp.	2,367
Arthur	1,172
Chatsworth	303
Chesley	1,741
Derby Twp.	1,507
Dundalk	700
Durham	1,520
Elmwood	350
Flesherton	410
Grand Valley	582
Hanover	2,724
Holstein	285
Horning's Mills	350
Kilsyth	.....
Kincardine	1,992
Lucknow	902
Markdale	869
Mount Forest	1,838
Neustadt	430
Orangeville	2,186
Owen Sound	12,218
Priceville	.....
Ripley	.....
Shelburne	1,063
Tara	520
Teeswater	852
Wingham	2,240
Total	**39,571**

OTTAWA SYSTEM

Ottawa	107,732

THUNDER BAY SYSTEM

Port Arthur	15,094

CENTRAL ONTARIO SYSTEM

Belleville	12,240
Bloomfield	600
Bowmanville	3,259
Brighton	1,376
Camden East Twp.	3,050
Cobourg	4,874
Colborne	869
Darlington Twp.	3,407
Deloro	259
Deseronto	2,017
Havelock	1,220
Kingston	23,261
Lakefield	1,133
Lindsay	7,841
Madoc	1,056
Marmora	856
Millbrook	740
Napanee	2,863
Newcastle	553
Newburgh	434
Norwood	698
Omemee	517
Orono	700
Oshawa	10,126
Peterborough	21,230
Pickering Twp.	4,382
Picton	3,165
Port Hope	4,394
Richmond Twp.	1,944
Seymour Twp.	2,506
Stirling	849
Trenton	5,736
Tweed	1,288
Wellington	853
Whitby	3,102
Whitby Twp.	1,734
Whitby E. Twp.	3,420
Total	**134,552**

ST. LAWRENCE SYSTEM

Alexandria	2,260
Apple Hill	.....
Brockville	9,326
Chesterville	949
Lancaster	593
Martintown	.....
Maxville	753
Prescott	2,774
Williamsburg	200
Winchester	1,019
Winchester Springs	.....
Total	**15,660**

RIDEAU SYSTEM

Carleton Place	3,786
Kemptville	1,179
Lanark	583
Perth	4,047
Smith's Falls	6,665
Total	**16,260**

ESSEX COUNTY SYSTEM

Amherstburg	2,170
Canard River	50
Cottam	333
Essex	1,753
Harrow	619
Kingsville	1,732
Leamington	4,360
Total	**11,017**

THOROLD SYSTEM

Thorold	5,012

THE aim of The Bulletin is to provide municipalities with a source of information regarding the activities of the Commission; to provide a medium through which matters of common interest may be discussed, and to promote a spirit of co-operation between Hydro Municipalities.